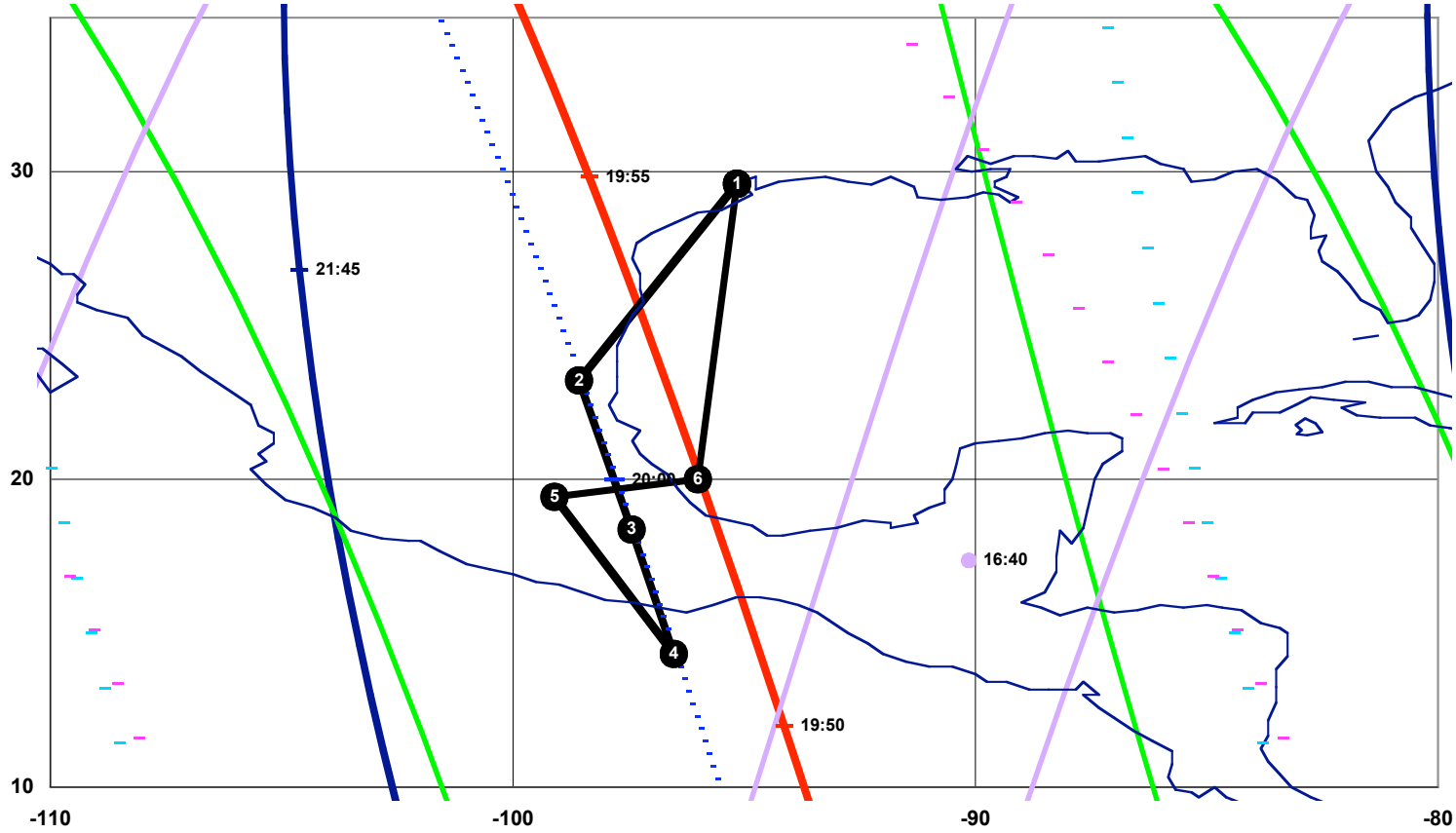
INTEX-B: Flight 6 (Science Flight; March 12, 2006; Sunday)

This was the fourth INTEX-B science flight conducted from Houston. The objectives for this flight were validation of Aura satellite instruments (TES and OMI), inter-comparison with the NSF/NCAR C-130, sampling of aged Mexico City pollution outflow and its near source characterization using both remote (DIAL) and in situ measurements . The nominal flight tracks and profiles are shown in the slides below but these were modified in-flight to take advantage of specific opportunities. Takeoff time was 1115 am (LT) and the flight duration was 7.8 hours.

All of the instruments aboard the DC-8 performed normally throughout the flight. The GT-LIF instrument is still not operating fully but did appear to collect some nitric oxide data. Major flow features at the surface included high pressure off the Atlantic Coast of Florida and a developing low pressure center and cold front over Kansas stretching southward to extreme west Texas. Aloft, a ridge (our long discussed ridge) was located over the East Coast, with a strengthening trough over the Rockies. The polar jet stream was located north of the Gulf Coast, while the subtropical jet was over northern Mexico and Gulf of Mexico. Cloudiness was extensive over the northern portion of the flight. Southeast and southern Texas were blanketed by low and upper level clouds. Northern Mexico had extensive cirrus due to the subtropical jet bringing Pacific moisture over the region. Only the southern part of the flight had few or no clouds at any altitude. Mexico City was virtually cloud free, with light winds (most southwesterly) in our low level flight legs. The inter-comparison region of the flight had considerable cirrus. No precipitation occurred anywhere near the flight region. However, a major severe weather outbreak occurred over the central Mississippi River Valley.

This was an excellent flight and we were able to meet all our objectives. At the start we climbed out of Houston in the southwesterly direction encountering several layers of pollution. During the early part of the flight there were low level clouds below and broken cirrus aloft. At 25 K ft we encountered tropical air influences with low ozone (18 ppb) and high humidity. We climbed to 35 Kft and prepared for a spiral for TES/OMI validation. On this spiral we descended down from 35 to 5.5 Kft as high terrain surrounding the spiral point prevented further descent. The skies were clear and we obtained complete lidar pictures of aerosol and ozone. Shortly after descent we met up with the NSF/NCAR C-130 (19:15 UT) for an inter-comparison randevouz that lasted about 1-hour along the TES track. Inter-comparisons with the C-130 were performed at 3 level legs at 5.5 Kft, 10.5 Kft and 17.5 Kft. During this time the DC-8 and C-130 flew in formation in clear skies sampling air where concentrations of species varied substantially to provide an excellent dynamic range for inter-comparison. As an example CO varied by more than a factor of two. After this inter-comparison we headed south and sampled pollution that also contained significant levels of dust. Subsequently we did a land-ocean transect and provide another spiral along the TES track at the southernmost point (14 N; 96.5 W). This land-ocean transition was particularly requested by TES for accurate retrievals when the surface temperatures were changing. At this point we headed in the northwesterly direction and sampled the Mexico City boundary layer at 1-2 Kft AGL across the city over T0-T1-T2 and continuing east over the mountains and to the coast. A mix of polluted air (CO-1 ppm; O3-150 ppb; NO2- 10 ppb; HCHO-10 ppb; PAN-1 ppb; hot-CN>10^4) that had both fossil fuel and biomass burning signatures was sampled. East of the city concentrations declined and quickly reached rather modest levels (CO- 250 ppb, O3-70 ppb). Once over water we climbed to 25 Kft and headed towards Houston directly necessitated by low fuel conditions due to longer than anticipated inter-comparison legs. Lidar showed evidence of Mexico City outflow at low levels along this northerly track and we were able to descend down to 7.5 Kft to sample this aged outflow (CO-125; O3-65). We approached Houston on a low level track across SE Texas and NO2 levels there were typically 1-2 ppb.

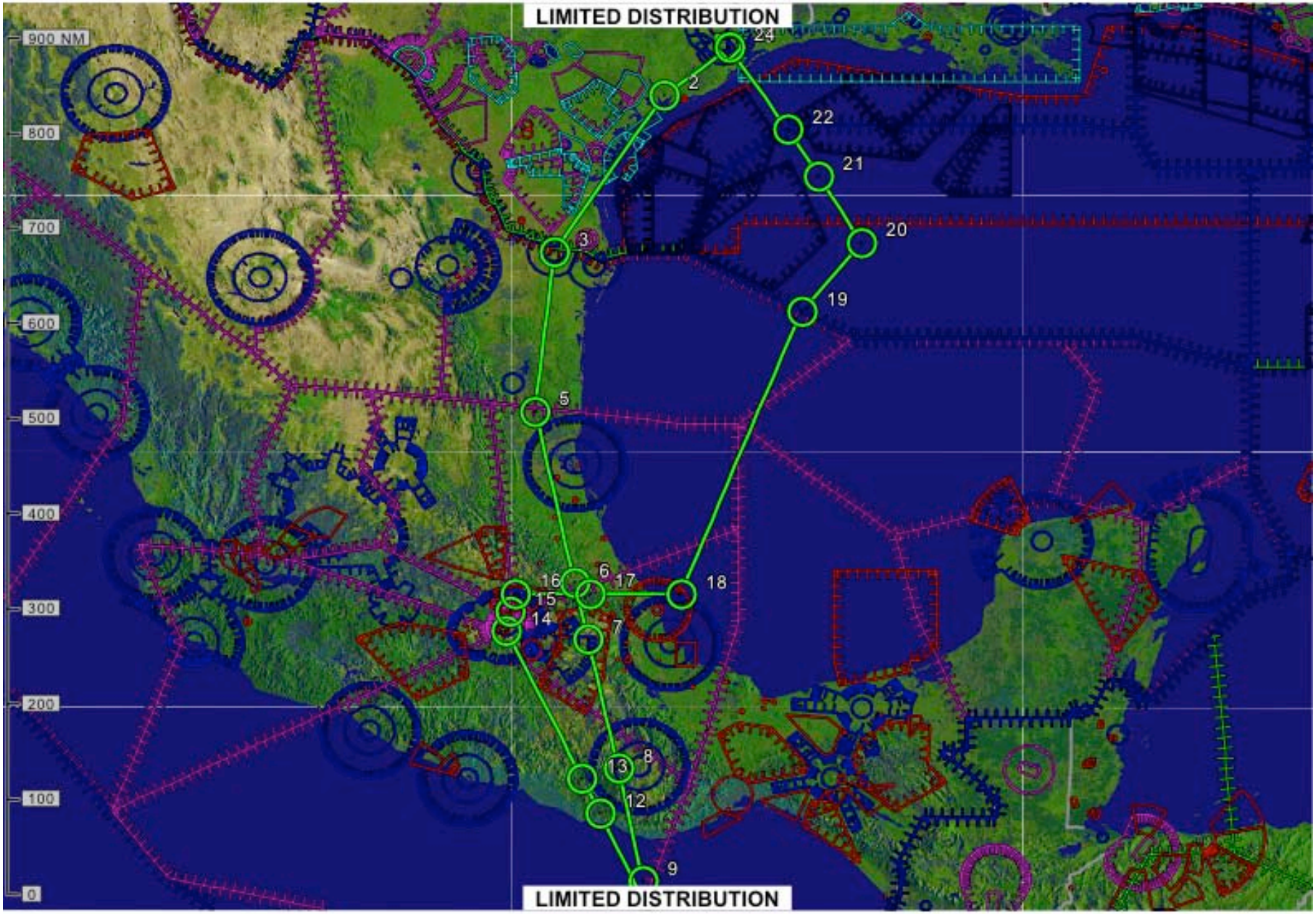
ICATS archived data files for INTEX-B are available at: http://www.nasa.gov/centers/dryden/research/AirSci/DC-8/ICATS/FY06/INTEX-B/index.html



Flight 6
12 March 2006
Takeoff:
1115 hrs

MLS
MLS timing
HIRDLS
HIRDLS timing
TES
TES timing
TES-Special
TES-Special timing
OMI-East Edge
OMI-West Edge
AIRS swath
MOPITT timing
MOPITT swath
DC-8 Flight Path
Mexico City

Point	1	2	3	4	5	6	7
Latitude	29.60733	23.216	18.3687	14.325	19.43	20	29.60733
Longitude	-95.1588	-98.5713	-97.4363	-96.5242	-99.1	-96	-95.1588
Cum. Flt. Time	0:00	1:22	2:49	3:52	4:57	5:47	7:38
Leg Flt. Time		1:22	0:57	0:47	1:05	0:34	1:51
Local Time	11:15	12:37	14:04	15:07	16:12	17:02	18:53
UTC	17:15	18:37	20:04	21:07	22:12	23:02	0:53
Spiral		0:30	0:15		0:15		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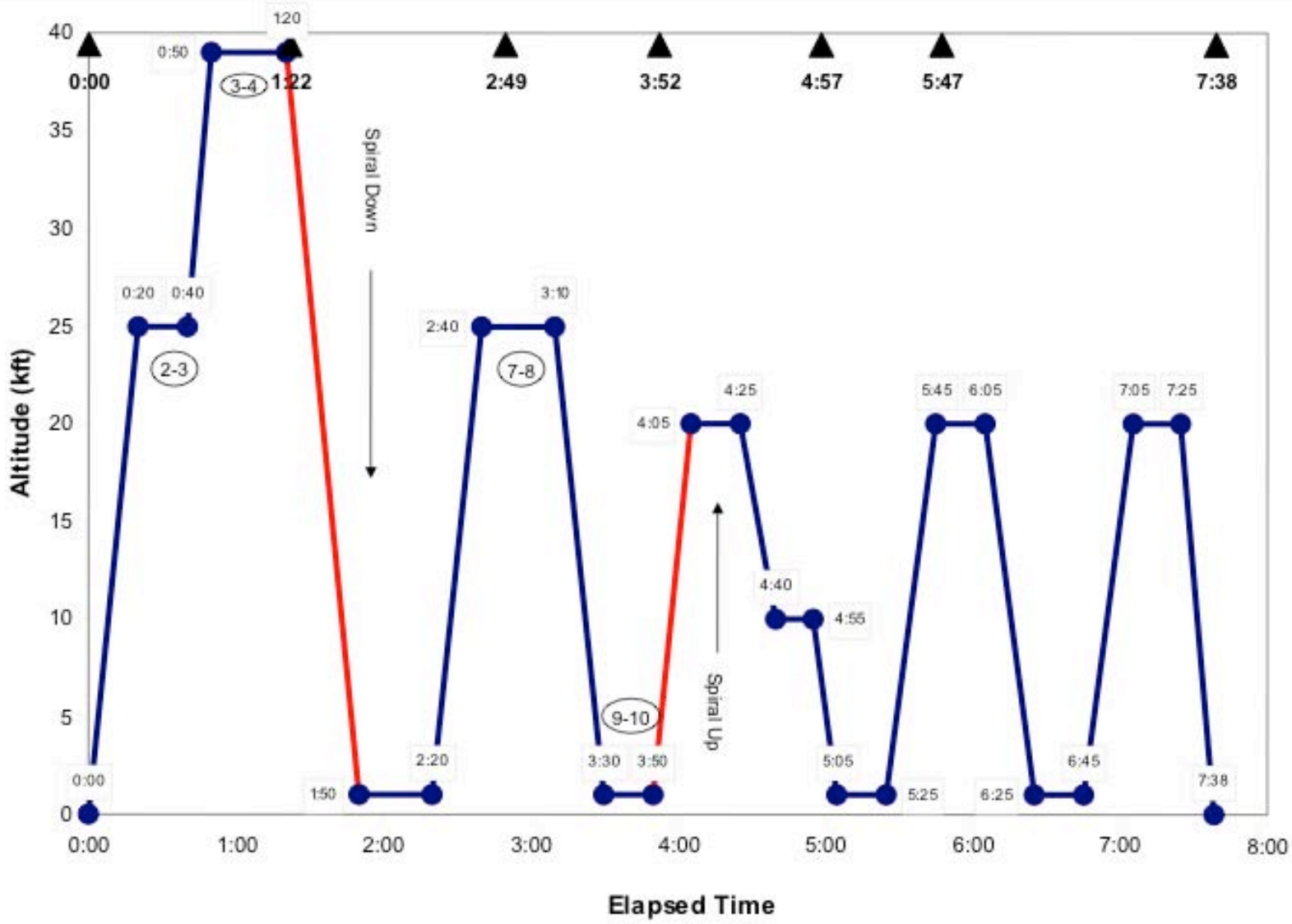
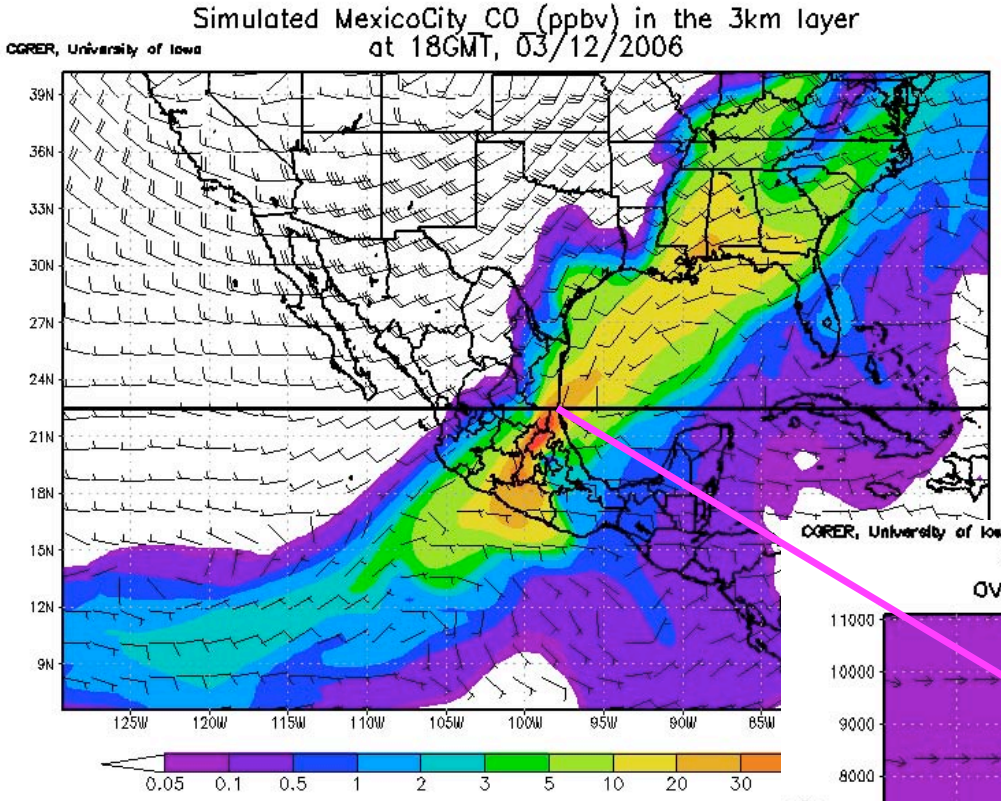
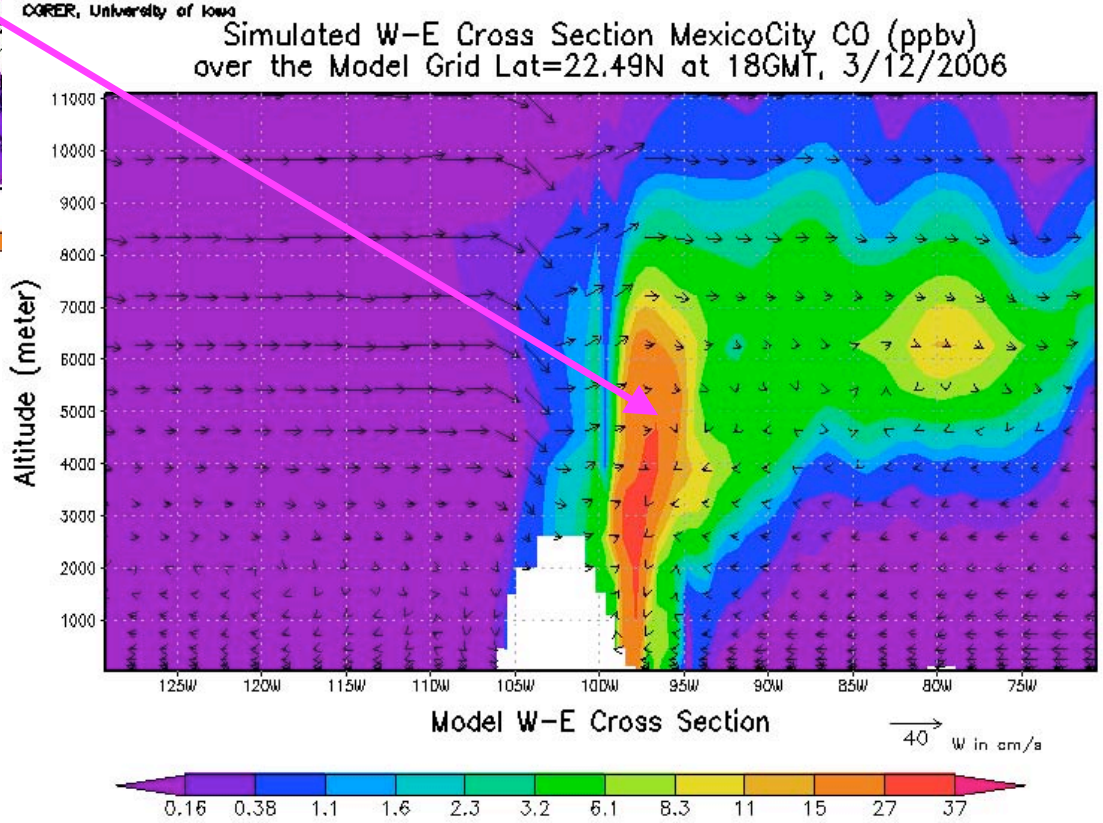


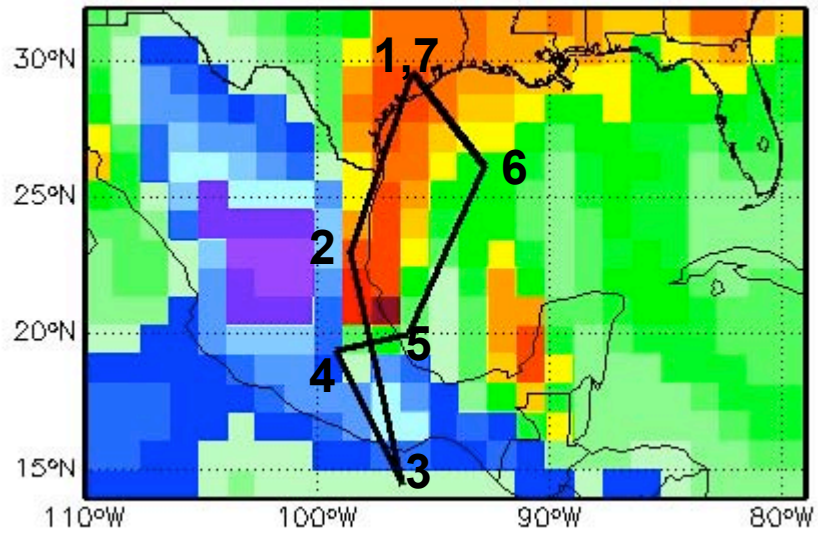
Note: In-Progress profiling in **Blue**; Spirals in **Red**; Way points annotated with triangles (?).



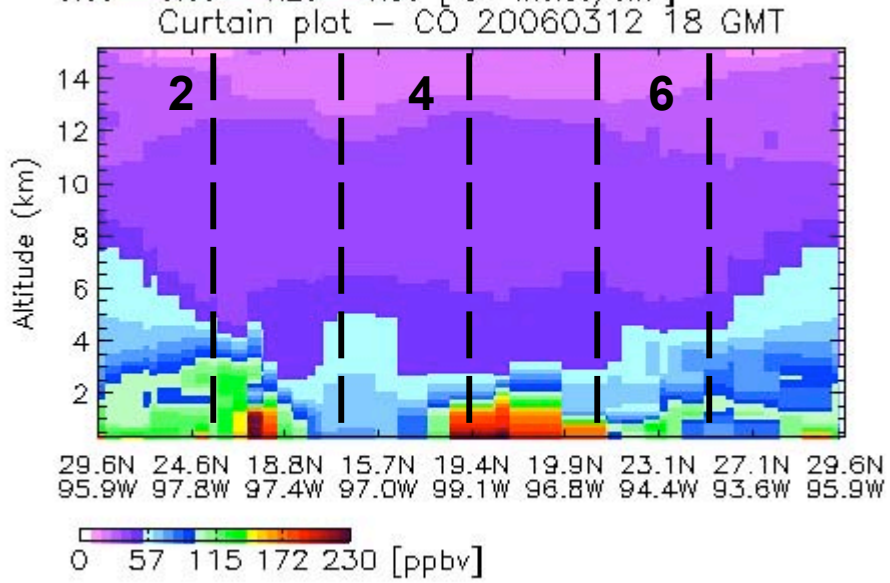
STEM Model
Sunday- noon
3/12/06



GMAO Model
Sunday-Noon
3.12.06



CO Column



CO